

REMARKS

In response to the Office Action mailed April 4, 2006, the Applicants respectfully request reconsideration. To further the prosecution of this Application, the Applicants submit the following remarks and have canceled claims. The claims as now presented are believed to be in allowable condition.

Claims 1-16 and 21-28 were pending in this Application. By this Amendment, claim 13 has been cancelled. Claim 5 has been amended to include the content of cancelled dependent claim 13. Additionally, independent claims 1, 4, and 14 have been amended to include the content of cancelled claim 13. Claims 29-31 have been added. Accordingly, claims 1-12, 14-16, and 21-31 are now pending in this Application. No new matter has been added to the application by the amendments. Claims 1, 4, 5, and 14 are independent claims.

Rejections under §102 and §103

Claims 5, 14, 16, 25, and 26 were rejected under 35 U.S.C. §102(a) as being anticipated by U.S. Patent Publication No. US2003/0174478 to Oggioni et al. (hereafter Oggioni). Claims 1-4, 6-8, 10-13, 15, 21-24, 27, and 28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Oggioni in view of U.S. Patent Publication No. US2003/0122242 to Takeuchi (hereafter Takeuchi). Claim 9 was rejected under Oggioni in view of Takeuchi and further in view of U.S. Patent Publication No. US2004/0150102 to Lee et al. (hereafter Lee). The Applicants respectfully traverse each of these rejections and request reconsideration. The claims are in allowable condition.

Claims 1 and 4 each generally relate to a circuit board module. Each of claims 1 and 4 recite, in part, a circuit board having a component mounting location and a circuit board component mounted to the component mounting location of the circuit board. Claims 5 and 14 generally relate to a circuit board component. Each of claims 1, 4, 5, and 14 were amended, in part, to recite the

component. Each of claims 1, 4, 5, and 14 were amended, in part, to recite the circuit board component being an Application Specific Integrated Circuit device.

The Office Action rejected claims 5 and 14 under 35 U.S.C. §102(a) as being anticipated by Oggioni. However, Oggioni does not teach or suggest every element of claims 5 and 14. In particular, Oggioni does not teach or suggest the claimed circuit board component being an Application Specific Integrated Circuit device.

Oggioni generally relates to Ball Grid Array (BGA) electronic modules and more particularly to a package for High Frequency applications. The package includes a thin dielectric layer 403 that is laid on a metal (e.g. copper) stiffener 401. A chip 407 is attached on the same side of the dielectric layer 403 and the electrical connections between the chip and the pads 409 are done with metallic traces running on the surface of the dielectric layer 403. Oggioni indicates that the chip 407 (e.g., integrated circuit) is to be used with the dielectric layer and the stiffener material as opposed to the dielectric layer and the stiffener material forming part of the integrated circuit itself. Specifically, Oggioni does not teach or suggest an Application Specific Integrated Circuit comprising:

- a substrate having non-conductive material and conductive material supported by the non-conductive material, the conductive material defining (i) a circuit board interface, (ii) a die interface, (iii) a heat spreader interface, and (iv) a set of connections which interconnects the circuit board interface, the die interface and the heat spreader interface,

- a die coupled to the die interface defined by the conductive material of the substrate, the die including integrated circuitry which is configured to electrically communicate with the circuit board when the circuit board couples to the circuit board interface defined by the conductive material of the substrate, and

- a heat spreader coupled to the heat spreader interface defined by the conductive material of the substrate, the heat spreader being configured to dissipate heat from the die, the heat spreader in combination with the heat spreader interface forming an electromagnetic interference shield when a portion of the circuit

board interface connects to a ground reference of the circuit board through the circuit board interface

such as claimed by the Applicants in representative claim 5.

Because Oggioni does not suggest or disclose every element of the Applicants' independent claims 5 or 14, the claims are patentable over the reference and the rejection of claims 5 and 14 under 35 U.S.C. §102(a) should be withdrawn. Accordingly, claims 5 and 14 are in allowable condition.

As indicated above, claims 6-8, 10-12, 23, and 24 which depend from claim 5, and claims 15, 16, 25, and 26 which depend from claim 14, were rejected under 35 U.S.C. §103(a) as being unpatentable over Oggioni in view of Takeuchi. Additionally, claim 9, which also depends upon claim 5, was rejected under 35 U.S.C. §103(a) as being unpatentable over Oggioni in view of Takeuchi and further in view of Lee. However, claims 6-12, 23, and 24 depend upon allowable independent claim 5 and claims 15, 16, 25, and 26 depend from allowable claim 14. The rejection of these dependent claims over the cited references is therefore moot and the claims should be allowed to issue for at least the reasons presented above.

The Office Action also rejected independent claims 1 and 4 under 35 U.S.C. §103(a) as being unpatentable over Oggioni in view of Takeuchi. However, neither Oggioni nor Takeuchi teaches or suggests every element of claims 1 and 4. As indicated above, Oggioni does not teach or suggest the claimed circuit board component being an Application Specific Integrated Circuit device. Takeuchi does not cure the shortcomings of Oggioni.

Takeuchi relates to a semiconductor package having an integrated heat spreader. Fig. 4 of Takeuchi illustrates a semiconductor package where an integrated circuit 402 is mounted on the package substrate 200 with a heat

spreader 404 thermally coupled to the substrate core (Paragraph 0018). In Takeuchi the integrated circuit 402 is used with the package substrate 200 and the heat spreader 404, as opposed to the package substrate 200 and the heat spreader 404 forming part of the integrated circuit itself. Specifically, Takeuchi does not teach or suggest Application Specific Integrated Circuit comprising:

- a substrate having non-conductive material and conductive material supported by the non-conductive material, the conductive material defining (i) a circuit board interface, (ii) a die interface, (iii) a heat spreader interface, and (iv) a set of connections which interconnects the circuit board interface, the die interface and the heat spreader interface,

- a die coupled to the die interface defined by the conductive material of the substrate, the die including integrated circuitry which is configured to electrically communicate with the circuit board when the circuit board couples to the circuit board interface defined by the conductive material of the substrate, and

- a heat spreader coupled to the heat spreader interface defined by the conductive material of the substrate, the heat spreader being configured to dissipate heat from the die, the heat spreader in combination with the heat spreader interface forming an electromagnetic interference shield when a portion of the circuit board interface connects to a ground reference of the circuit board through the circuit board interface

such as claimed by the Applicants in representative claim 1.

Because neither Oggioni nor Takeuchi, either alone or in combination, suggest or disclose every element of the Applicants' independent claim 1 or 4, the claims are patentable over the references and the rejection of claims 1 and 4 under 35 U.S.C. §103(a) should be withdrawn. Accordingly, claims 1 and 4 are in allowable condition. Additionally, claims 2, 3, 21, and 22 which depend from claim 1 and claims 27 and 28 which depend from claim 4 should also be allowed for at least the reasons presented above.

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Newly Added Claims

Claims 29-31 have been added and are believed to be in allowable condition. Claims 29-31 depend from claim 1. Support for claim 29 is provided within the Specification, for example, on page 8, lines 3-5. Support for claims 30 and 31 is provided within the Specification, for example, in Figs. 5 and on page 12, lines 8-23. No new matter has been added.

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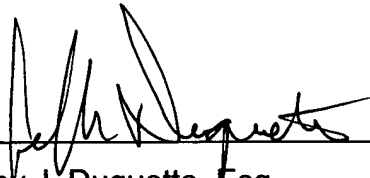
Conclusion

In view of the foregoing remarks, this Application should be in condition for allowance. A Notice to this affect is respectfully requested. If the Examiner believes, after this Amendment, that the Application is not in condition for allowance, the Examiner is respectfully requested to call the Applicants' Representative at the number below.

The Applicants hereby petition for any extension of time which is required to maintain the pendency of this case. If there is a fee occasioned by this Amendment, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50-3661.

If the enclosed papers or fees are considered incomplete, the Patent Office is respectfully requested to contact the undersigned collect at (508) 616-2900, in Westborough, Massachusetts.

Respectfully submitted,



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